THE ASTROPHYSICAL JOURNAL

CONTENTS OF VOLUME 604, PART 1

2004 MARCH 20, NUMBER 1

	Page
INTERACTING DARK MATTER AND DARK ENERGY *Glennys R. Farrar & P. J. E. Peebles*	1
EARLY HIERARCHICAL FORMATION OF MASSIVE GALAXIES TRIGGERED BY INTERACTIONS *N. Menci, A. Cavaliere, A. Fontana, E. Giallongo, F. Poli, & V. Vittorini*	12
INVESTIGATING THE ORIGINS OF DARK MATTER HALO DENSITY PROFILES *Liliya L. R. Williams, Arif Babul, & Julianne J. Dalcanton*	18
A GENERAL FORMULATION OF THE SOURCE CONFUSION STATISTICS AND APPLICATION TO INFRARED GALAXY SURVEYS *Tsutomu T. Takeuchi & Takako T. Ishii*	40
THE CORES OF THE Fe K LINES IN SEYFERT 1 GALAXIES OBSERVED BY THE *CHANDRA* HIGH ENERGY GRATING *Tahir Yaqoob & Urmila Padmanabhan*	63
RADIATIVE SHOCK–INDUCED COLLAPSE OF INTERGALACTIC CLOUDS *P. Chris Fragile, Stephen D. Murray, Peter Anninos, & Wil van Breugel*	74
THE DARK MATTER DISTRIBUTION IN THE CENTRAL REGIONS OF GALAXY CLUSTERS: IMPLICATIONS FOR COLD DARK MATTER *David J. Sand, Tommaso Treu, Graham P. Smith, & Richard S. Ellis*	88
THE EVOLUTION OF DIFFUSE RADIO SOURCES IN GALAXY CLUSTERS *Ping-Hung Kuo, Chorng-Yuan Hwang, & Wing-Huen Ip*	108
THE DARK MATTER RADIAL PROFILE IN THE CORE OF THE RELAXED CLUSTER A2589 © *David A. Buote & Aaron D. Lewis*	116
MOLECULAR GAS IN THE LENSED LYMAN BREAK GALAXY cB58 © *Andrew J. Baker, Linda J. Tacconi, Reinhard Genzel, Matthew D. Lehnert, & Dieter Lutz*	125
Hα-DERIVED STAR FORMATION RATES FOR THE $z = 0.84$ GALAXY CLUSTER Cl J0023+0423B © *Rose A. Finn, Dennis Zaritsky, & Donald W. McCarthy, Jr.*	141
NGC 3125-1: THE MOST EXTREME WOLF-RAYET STAR CLUSTER KNOWN IN THE LOCAL UNIVERSE *Rupali Chandar, Claus Leitherer, & Christy A. Tremonti*	153
QUANTIFYING THE DRIVERS OF STAR FORMATION ON GALACTIC SCALES. I. THE SMALL MAGELLANIC CLOUD *Dennis Zaritsky & Jason Harris*	167
A NEW LOOK AT THE KINEMATICS OF NEUTRAL HYDROGEN IN THE SMALL MAGELLANIC CLOUD *S. Stanimirović, L. Staveley-Smith, & P. A. Jones*	176
NUMERICAL SIMULATIONS OF LOCAL SHOCK REFORMATION AND ION ACCELERATION IN SUPERNOVA REMNANTS *R. E. Lee, S. C. Chapman, & R. O. Dendy*	187
MODIFICATION OF PROJECTED VELOCITY POWER SPECTRA BY DENSITY INHOMOGENEITIES IN COMPRESSIBLE SUPERSONIC TURBULENCE © *Christopher M. Brunt & Mordecai-Mark Mac Low*	196
A LABORATORY INVESTIGATION OF SUPERSONIC CLUMPY FLOWS: EXPERIMENTAL DESIGN AND THEORETICAL ANALYSIS © *A. Y. Poludnenko, K. K. Dannenberg, R. P. Drake, A. Frank, J. Knauer, D. D. Meyerhofer, M. Furnish, J. R. Asay, & S. Mitran*	213
H_2 FORMATION ON GRAIN SURFACES *S. Cazaux & A. G. G. M. Tielens*	222
EFFECTS OF GRAIN SIZE ON THE SPECTRAL ENERGY DISTRIBUTION OF DUSTY CIRCUMSTELLAR ENVELOPES *A. C. Carciofi, J. E. Bjorkman, & A. M. Magalhães*	238
DEUTERATED INTERSTELLAR POLYCYCLIC AROMATIC HYDROCARBONS *E. Peeters, L. J. Allamandola, C. W. Bauschlicher, Jr., D. M. Hudgins, S. A. Sandford, & A. G. G. M. Tielens*	252

	Page
BIPOLAR MOLECULAR OUTFLOWS FROM HIGH-MASS PROTOSTARS *Yu-Nung Su, Qizhou Zhang, & Jeremy Lim*	258
THEORETICAL EXAMINATION OF THE LITHIUM DEPLETION BOUNDARY *Christopher J. Burke, Marc H. Pinsonneault, & Alison Sills*	272
ACCRETION AND OUTFLOW IN THE SUBSTELLAR DOMAIN: MAGELLAN SPECTROSCOPY OF LS-RCRA 1 *David Barrado y Navascués, Subhanjoy Mohanty, & Ray Jayawardhana*	284
IMPULSIVE ELECTRON ACCELERATION BY GRAVITATIONAL WAVES *Loukas Vlahos, George Voyatzis, & Demetrios Papadopoulos*	297
CONSTRAINING THE ORIGIN OF TeV PHOTONS FROM GAMMA-RAY BURSTS WITH DELAYED MeV–GeV EMISSION FORMED BY INTERACTION WITH COSMIC INFRARED/MICROWAVE BACKGROUND PHOTONS *X. Y. Wang, K. S. Cheng, Z. G. Dai, & T. Lu*	306
CAN THE BUMP BE OBSERVED IN THE EARLY AFTERGLOW OF GAMMA-RAY BURSTS WITH X-RAY LINE EMISSION FEATURES? *W. H. Gao & D. M. Wei*	312
GAMMA-RAY LUMINOSITY AND DEATH LINES OF PULSARS WITH OUTER GAPS *L. Zhang, K. S. Cheng, Z. J. Jiang, & P. Leung*	317
GREEN BANK TELESCOPE DISCOVERY OF TWO BINARY MILLISECOND PULSARS IN THE GLOBULAR CLUSTER M30 *Scott M. Ransom, Ingrid H. Stairs, Donald C. Backer, Lincoln J. Greenhill, Cees G. Bassa, Jason W. T. Hessels, & Victoria M. Kaspi*	328
PULSAR PARALLAXES AT 5 GHz WITH THE VERY LONG BASELINE ARRAY *S. Chatterjee, J. M. Cordes, W. H. T. Vlemmings, Z. Arzoumanian, W. M. Goss, & T. J. W. Lazio*	339
THE HOT WHITE DWARF IN THE CATACLYSMIC VARIABLE MV LYRAE © *D. W. Hoard, A. P. Linnell, Paula Szkody, Robert E. Fried, Edward M. Sion, Ivan Hubeny, & M. A. Wolfe*	346
POLARIZED Hα WINGS IN THE SYMBIOTIC STARS AG DRACONIS AND Z ANDROMEDAE *Yuji Ikeda, Hiroshi Akitaya, Kentaro Matsuda, Ken'ichi Homma, Munezo Seki, Koji S. Kawabata, Ryuko Hirata, & Akira Okazaki*	357
CHEMICAL ABUNDANCES FOR A SAMPLE OF SOUTHERN OB STARS *Simone Daflon, Katia Cunha, & Keith Butler*	362
GRAVITATIONAL MICROLENSING: A TOOL FOR DETECTING AND CHARACTERIZING FREE-FLOATING PLANETS *Cheongho Han, Sun-Ju Chung, Doeon Kim, Byeong-Gon Park, Yoon-Hyun Ryu, Sangjun Kang, & Dong Wook Lee*	372
PHOTOMETRIC TRANSITS FROM THE MACHO PROJECT DATABASE *A. J. Drake & K. H. Cook*	379
TOWARD A DETERMINISTIC MODEL OF PLANETARY FORMATION. I. A DESERT IN THE MASS AND SEMIMAJOR AXIS DISTRIBUTIONS OF EXTRASOLAR PLANETS © *S. Ida & D. N. C. Lin*	388
DETECTION OF COOL DUST AROUND THE G2 V STAR HD 107146 © *Jonathan P. Williams, Joan Najita, Michael C. Liu, Sandrine Bottinelli, John M. Carpenter, Lynne A. Hillenbrand, Michael R. Meyer, & David R. Soderblom*	414
A STUDY OF THE KINEMATIC EVOLUTION OF CORONAL MASS EJECTIONS *J. Zhang, K. P. Dere, R. A. Howard, & A. Vourlidas*	420
EFFECTS OF FLOW ON STRUCTURE AND ABUNDANCES IN MULTISPECIES SOLAR CORONAL LOOPS *Dawn D. Lenz*	433
STUDIES OF MICROFLARES IN *RHESSI* HARD X-RAY, BIG BEAR SOLAR OBSERVATORY Hα, AND MICHELSON DOPPLER IMAGER MAGNETOGRAMS *Chang Liu, Jiong Qiu, Dale E. Gary, Säm Krucker, & Haimin Wang*	442
DETAILED SUMER OBSERVATIONS OF CORONAL LOOP FOOTPOINT DYNAMICS © *Scott W. McIntosh & Arthur I. Poland*	449
LOOKING FOR GRAVITY-MODE MULTIPLETS WITH THE GOLF EXPERIMENT ABOARD *SOHO* © *S. Turck-Chièze, R. A. García, S. Couvidat, R. K. Ulrich, L. Bertello, F. Varadi, A. G. Kosovichev, A. H. Gabriel, G. Berthomieu, A. S. Brun, I. Lopes, P. Pallé, J. Provost, J. M. Robillot, & T. Roca Cortés*	455
CORE-HALO DISTRIBUTION FUNCTIONS: A NATURAL EQUILIBRIUM STATE IN GENERALIZED THERMOSTATISTICS *M. P. Leubner*	470
ERRATUM: "THE BEAMING PATTERN AND SPECTRUM OF RADIATION FROM INVERSE COMPTON SCATTERING IN BLAZARS" (ApJ, 561, 111 [2001]) *M. Georganopoulos, J. G. Kirk, & A. Mastichiadis*	480

CONTENTS

2004 APRIL 1, NUMBER 2

	Page
DARK ENERGY AND THE HUBBLE AGE *L. M. Krauss*	481
EARLY REIONIZATION BY MINIQUASARS *P. Madau, M. J. Rees, M. Volonteri, F. Haardt, & S. P. Oh*	484
THE COSMIC EVOLUTION OF QUASAR HOST GALAXIES *Renato Falomo, Jari K. Kotilainen, Claudio Pagani, Riccardo Scarpa, & Aldo Treves*	495
DETECTABILITY OF LONG GAMMA-RAY BURST AFTERGLOWS FROM VERY HIGH REDSHIFTS *L. J. Gou, P. Mészáros, T. Abel, & B. Zhang*	508
THE LUMINOSITY-SIZE AND MASS-SIZE RELATIONS OF GALAXIES OUT TO $z \sim 3$ (E) *Ignacio Trujillo, Gregory Rudnick, Hans-Walter Rix, Ivo Labbé, Marijn Franx, Emanuele Daddi, Pieter G. van Dokkum, Natascha M. Förster Schreiber, Konrad Kuijken, Alan Moorwood, Huub Röttgering, Arjen van de Wel, Paul van der Werf, & Lottie van Starkenburg*	521
A SURVEY OF STAR-FORMING GALAXIES IN THE $1.4 \lesssim z \lesssim 2.5$ REDSHIFT DESERT: OVERVIEW (E) *Charles C. Steidel, Alice E. Shapley, Max Pettini, Kurt L. Adelberger, Dawn K. Erb, Naveen A. Reddy, & Matthew P. Hunt*	534
THE IRON UNRESOLVED TRANSITION ARRAY IN ACTIVE GALACTIC NUCLEI (E) *Hagai Netzer*	551
THE EFFECTS OF LOW-TEMPERATURE DIELECTRONIC RECOMBINATION ON THE RELATIVE POPULATIONS OF THE Fe M-SHELL STATES *S. B. Kraemer, G. J. Ferland, & J. R. Gabel*	556
LABORATORY WAVELENGTHS OF K-SHELL RESONANCE LINES OF O V AND O VI *Mike Schmidt, Peter Beiersdorfer, Hui Chen, Daniel B. Thorn, Elmar Träbert, & Ehud Behar*	562
[O I] 63 MICRON EMISSION FROM HIGH- AND LOW-LUMINOSITY ACTIVE GALACTIC NUCLEUS GALAXIES *Daniel A. Dale, George Helou, James R. Brauher, Roc M. Cutri, Sangeeta Malhotra, & Charles A. Beichman*	565
FOLLOW-UP *CHANDRA* OBSERVATIONS OF THREE CANDIDATE TIDAL DISRUPTION EVENTS *J. P. Halpern, S. Gezari, & S. Komossa*	572
CAN A "STANDARD" INITIAL MASS FUNCTION EXPLAIN THE METAL ENRICHMENT IN CLUSTERS OF GALAXIES? *L. Portinari, A. Moretti, C. Chiosi, & J. Sommer-Larsen*	579
WEAK-LENSING MASS RECONSTRUCTION OF THE INTERACTING CLUSTER 1E 0657−558: DIRECT EVIDENCE FOR THE EXISTENCE OF DARK MATTER *Douglas Clowe, Anthony Gonzalez, & Maxim Markevitch*	596
A *CHANDRA* STUDY OF THE EFFECTS OF A MAJOR MERGER ON THE STRUCTURE OF A2319 *Timothy B. O'Hara, Joseph J. Mohr, & Martin A. Guerrero*	604
THE DESTRUCTION OF BARS BY CENTRAL MASS CONCENTRATIONS *Juntai Shen & J. A. Sellwood*	614
FORMATION OF MASSIVE BLACK HOLES IN DENSE STAR CLUSTERS. I. MASS SEGREGATION AND CORE COLLAPSE *M. Atakan Gürkan, Marc Freitag, & Frederic A. Rasio*	632
XMM-NEWTON OBSERVATIONS OF AN INTERMEDIATE X-RAY OBJECT IN NGC 2276 (E) *David S. Davis & Richard F. Mushotzky*	653
DIFFUSE X-RAYS FROM THE INNER 3 PARSECS OF THE GALAXY (E) *Gabriel Rockefeller, Christopher L. Fryer, Fulvio Melia, & Michael S. Warren*	662
WAVE DAMPING BY MAGNETOHYDRODYNAMIC TURBULENCE AND ITS EFFECT ON COSMIC-RAY PROPAGATION IN THE INTERSTELLAR MEDIUM *Alison J. Farmer & Peter Goldreich*	671
ANALYTIC FORMS OF THE PERPENDICULAR DIFFUSION COEFFICIENT IN MAGNETOSTATIC TURBULENCE *A. Shalchi, J. W. Bieber, & W. H. Matthaeus*	675
LARGE-SCALE COSMIC-RAY ANISOTROPY KASCADE (E) *T. Antoni, W. D. Apel, A. F. Badea, K. Bekk, A. Bercuci, H. Blümer, H. Bozdog, I. M. Brancus, C. Büttner, K. Daumiller, P. Doll, R. Engel, J. Engler, F. Fessler, H. J. Gils, R. Glasstetter, A. Haungs, D. Heck, J. R. Hörandel, K.-H. Kampert, H. O. Klages, G. Maier, H. J. Mathes, H. J. Mayer, J. Milke, M. Müller, R. Obenland, J. Oehlschläger, S. Ostapchenko, M. Petcu, H. Rebel, A. Risse, M. Risse, M. Roth, G. Schatz, H. Schieler, J. Scholz, T. Thouw, H. Ulrich, J. van Buren, A. Vardanyan, A. Weindl, J. Wochele, & J. Zabierowski* (The KASCADE Collaboration)	687
REVEALING THE OBSCURED SUPERNOVA REMNANT KESTEVEN 32 WITH *CHANDRA* *Jacco Vink*	693
ON THE POSSIBILITY OF A STRONG MAGNETIC FIELD IN THE LOCAL INTERSTELLAR MEDIUM *V. Florinski, N. V. Pogorelov, G. P. Zank, B. E. Wood, & D. P. Cox*	700

	Page
ANISOTROPY OF MAGNETOHYDRODYNAMIC TURBULENCE AND THE POLARIZED SPECTRA OF OH MASERS *William D. Watson, Dmitri S. Wiebe, Jonathan C. McKinney, & Charles F. Gammie*	707
TRACING THE MAGNETIC FIELD IN ORION A © *Martin Houde, C. Darren Dowell, Roger H. Hildebrand, Jessie L. Dotson, John E. Vaillancourt, Thomas G. Phillips, Ruisheng Peng, & Pierre Bastien*	717
AN ASSESSMENT OF DYNAMICAL MASS CONSTRAINTS ON PRE–MAIN-SEQUENCE EVOLUTIONARY TRACKS © *Lynne A. Hillenbrand & Russel J. White*	741
ROTATION OF JETS FROM YOUNG STARS: NEW CLUES FROM THE *HUBBLE SPACE TELESCOPE* IMAGING SPECTROGRAPH *Deirdre Coffey, Francesca Bacciotti, Jens Woitas, Thomas P. Ray, & Jochen Eislöffel*	758
WARPING AND PRECESSION OF ACCRETION DISKS AROUND MAGNETIC STARS: NONLINEAR EVOLUTION *Harald P. Pfeiffer & Dong Lai*	766
ROLE OF BEAM GEOMETRY IN POPULATION STATISTICS AND PULSE PROFILES OF RADIO AND GAMMA-RAY PULSARS *Peter L. Gonthier, Robert Van Guilder, & Alice K. Harding*	775
POLYCYCLIC AROMATIC HYDROCARBONS AND CRYSTALLINE SILICATES IN THE BIPOLAR POST–ASYMPTOTIC GIANT BRANCH STAR IRAS 16279–4757 *M. Matsuura, A. A. Zijlstra, F. J. Molster, S. Hony, L. B. F. M. Waters, F. Kemper, J. E. Bowey, H. Chihara, C. Koike, & L. P. Keller*	791
LONG SECONDARY PERIODS IN PULSATING ASYMPTOTIC GIANT BRANCH STARS: AN INVESTIGATION OF THEIR ORIGIN *P. R. Wood, E. A. Olivier, & S. D. Kawaler*	800
THE FORMATION OF CATACLYSMIC VARIABLES WITH BROWN DWARF SECONDARIES *Michael Politano*	817
S ORIONIS 70: JUST A FOREGROUND FIELD BROWN DWARF? *Adam J. Burgasser, J. Davy Kirkpatrick, Mark R. McGovern, Ian S. McLean, L. Prato, & I. Neill Reid*	827
USING NARROWBAND PHOTOMETRY TO CLASSIFY STARS AND BROWN DWARFS © *A. K. Mainzer, Ian S. McLean, J. L. Sievers, & E. T. Young*	832
IMPROVED TRANSPORT EQUATIONS FOR FULLY IONIZED GASES *Mari Anne Killie, Åse Marit Janse, Øystein Lie-Svendsen, & Egil Leer*	842
IMPROVED ATOMIC DATA FOR Ho II AND NEW HOLMIUM ABUNDANCES FOR THE SUN AND THREE METAL-POOR STARS *J. E. Lawler, C. Sneden, & J. J. Cowan*	850
THE PARALLEL MEAN FREE PATH OF HELIOSPHERIC COSMIC RAYS IN COMPOSITE SLAB/TWO-DIMENSIONAL GEOMETRY. I. THE DAMPING MODEL OF DYNAMICAL TURBULENCE *A. Shalchi & R. Schlickeiser*	861
ON COLLISIONLESS ELECTRON-ION TEMPERATURE EQUILIBRATION IN THE FAST SOLAR WIND *J. Martin Laming*	874
PARTICLE ACCELERATION ASYMMETRY IN A RECONNECTING NONNEUTRAL CURRENT SHEET *Valentina V. Zharkova & Mykola Gordovskyy*	884
POSITRON-EMITTER PRODUCTION IN SOLAR FLARES FROM ^{3}He REACTIONS *Benzion Kozlovsky, R. J. Murphy, & G. H. Share*	892
MAGNETIC RECONNECTION AND MASS ACCELERATION IN FLARE–CORONAL MASS EJECTION EVENTS *Jiong Qiu, Haimin Wang, C. Z. Cheng, & Dale E. Gary*	900
PLASMA FLOWS OBSERVED IN MAGNETIC FLUX CONCENTRATIONS AND SUNSPOT FINE STRUCTURE USING ADAPTIVE OPTICS *Thomas R. Rimmele*	906
CHARACTERISTIC SCALES OF CHROMOSPHERIC OSCILLATION WAVE PACKETS © *Scott W. McIntosh & Darren G. Smillie*	924
PROPAGATING WAVES AND MAGNETOHYDRODYNAMIC MODE COUPLING IN THE QUIET-SUN NETWORK *D. Shaun Bloomfield, R. T. James McAteer, Mihalis Mathioudakis, David R. Williams, & Francis P. Keenan*	936
THE SUN'S PREFERRED LONGITUDES AND THE COUPLING OF MAGNETIC DYNAMO MODES *Alberto Bigazzi & Alexander Ruzmaikin*	944
THE ZEEMAN EFFECT IN THE G BAND *H. Uitenbroek, E. Miller-Ricci, A. Asensio Ramos, & J. Trujillo Bueno*	960
TRACING THE "ACOUSTIC" SOLAR CYCLE: A DIRECT COMPARISON OF BiSON AND GOLF LOW-l p-MODE VARIATIONS *S. J. Jiménez-Reyes, W. J. Chaplin, Y. Elsworth, & R. A. García*	969
INSTRUCTIONS TO AUTHORS	i